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PATENT APPLICATION

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IN THE
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Inventor(s): Preeti N. Bhoi et al

Confirmation No.:

Application No.: 09/495,818

Examiner:

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Group Art Unit: 2141

Title: TRAFFIC-AWARE REQUEST PROCESSING FOR NETWORK APPLICATIONS

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Commissioner For Patents
PO Box 1450
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TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith in **triplicate** is the Appeal Brief in this application with respect to the Notice of Appeal filed on **April 26, 2004**.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $330.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( )	one month	$110.00
( )	two months	$420.00
( )	three months	$950.00
( )	four months	$1480.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **08-2025** the sum of **$330.00**. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

Date: June 28, 2004

Respectfully submitted,

Preeti N. Bhoi et al

By _____

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I hereby certify that this document is being filed by personal delivery to the Customer Service Window, Crystal Plaza 2, 1B03 220 20th Street S, Arlington Virginia, 22202 of the United States Patent & Trademark Office on the date indicated above.

By: _____ Reg No 32,858
(Attorney Signature and Reg. No.)

I. Real Party in Interest

The present application is assigned to Hewlett Packard.

II. Related Appeals and Interferences

The Appellants' legal representative does not know of any other appeal or interference which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-20 remain rejected.

IV. Status of Amendments

An Amendment After Final was filed March 23, 2004 wherein the only amendment was directed to replacing the title to address the Examiner's objection in the Final Office Action. In an Advisory Action dated April 2, 2004, the Examiner refused entry of the proposed Amendment because it was "not deemed to place the application in better form for Appeal by materially reducing or simplifying the issues for Appeal".

A Substitute Amendment After Final is submitted hereto to reintroduce the proposed change of Title. Entry of this Amendment is requested to reduce the number of issues on appeal.

V. Summary of the Invention

The present application discloses systems and methods for minimizing the response time of an application module, such as an Internet server which hosts applications accessed by remote user terminals, or clients. Exemplary embodiments include a **network interaction module** and an **external queue**. The network interaction module is used to "fetch" external requests from the external queue, and

to **determine which requests will not be processed** based on, among other features, the **processing capacity** of the application module and the **rate at which external requests arrive at the external queue**.

Referring to Appellants' Figure 3, an exemplary embodiment is disclosed which includes a data server system 40 having a server application system 44 connected to an external kernel 41. The kernel 41 includes an external queue 42 which functions as a TCP listen queue. The queue is external to the server application system 44, and stores external TCP connection requests (e.g., client requests to the data server system 40) before the requests are fetched into the server application system 44 for processing. The server application system 44 includes a network interaction module 45 connected to the external queue 42.

With this configuration, the network interaction module 45 can selectively assess external connection requests stored in the external queue 42 to determine which requests will not be processed. Requests can effectively be screened by the server application system 44 **before** they are fetched for service by the server application 44, as described at specification page 7, lines 18-25.

The network interaction module 45 can determine which fetched requests will not be processed by the application module 46 based on the processing capacity of the application module 46 and the rate at which the external requests arrive at the queue 42. As described at page 8, line 11-page 9, line 3, after determining which requests will not be processed, the module 45 fetches all requests from the external queue. If the module 45 can not store all of the new requests, any such requests which can not be stored are also treated as not-to-be processed requests. Network interaction module 45 closes the TCP connection associated with a rejected request or sends a rejection response with status information (page, lines 4-11). Thus, exemplary embodiments do **not** simply reply on conventional TCP/IP techniques for processing requests, but are proactive in actually determining which requests will not be processed.

These features are broadly encompassed by claim 1. Claim 1 recites a TCP/IP-based application system which includes, among other features, a **network interaction module** (such as server network interaction module 45) coupled to an application module (such as application module 46) and an **external queue** (such as listen queue 42) to fetch external requests from the external queue into the application system. The network interaction module **determines which, if any, of the fetched requests will not be processed** by the application module based on the **processing capacity** of the application module and the **rate of the external requests arriving at the external queue**.

Claim 14 recites a TCP/IP based application system wherein a method of minimizing a response time of the application system to external requests is recited. In addition to reciting features similar to those recited with respect to claim 1, claim 14 also recites periodically fetching **all** of external requests stored in the external queue. By fetching **all** of the requests stored in the external queue, such as queue 42, the possibility of TCP time outs and the possibility of requests stored in the external queue being dropped, can be minimized, as described at specification page 9, lines 15-22.

Exemplary embodiments encompassed by Appellant's claims provide numerous advantages including, an ability to minimize the response time of an application module (e.g., application server) to external requests as described at specification page 9, lines 4-14. In addition, exemplary embodiments allow an application module to decide which, if any, of the external requests should be denied service, rather than leaving such a determination to fall upon the system's TCP/IP stack in kernel 41, as described at page 9, line 22-page 10, line 1. Exemplary embodiments can ensure that process delays due to a heavy demand on a server will not be misinterpreted as an overload of the network interconnect.

VI. The Issues

Whether U.S. Patent No. 6,321,272, Relied Upon Under 35 U.S.C. §102(e), Discloses Each And Every Element Of Independent Claims 1 and 14

VII. Grouping of Claims

Each of the Appellant's claims recites a novel combination of elements, and must be considered independently on its merits. For example, Appellant's independent claims 1 and 14 must be considered separately. Because these claims are considered patentable, all arguments which apply to these claims necessarily apply to all of the remaining claims.

VIII. Argument

U.S. Patent No. 6,321,272, Relied Upon Under 35 U.S.C. §102(e), Fails To Disclose Each And Every Element Of Independent Claims 1 and 14

Appellants' independent claims 1 and 14 recite features that are neither taught nor suggested by the Swales patent. For example, the Swales patent does not teach or suggest, among other features, a **network interaction module** coupled to an application module and an **external queue** (1) to fetch external requests from the external queue into the application system and (2) **to determine which, if any, of the fetched requests will not be processed** by the application module based on the **processing capacity** of the application module and the **rate of the external requests arriving at the external queue**.

1. The Final Rejection

On pages 2-4 of the Final Office Action dated December 24, 2003 (Paper No. 8), the Examiner sets forth the basis for rejecting claims 1-20 as being anticipated by

the Swales patent. In the last six lines of the paragraph bridging pages 2-3, the Examiner states:

> Swales teaches processing based on processing capacity and rate of requests, col. 11, lines 30-34, col. 12, lines 43-45, col. 13, lines 4-7, 34-38.

On page 4 of the Final Office Action, the Examiner asserts in numbered paragraph 18 that "The broad claim language used is interpreted on its face and based on this interpretation the claims have been rejected."

On page 5 of the Final Office Action, the Examiner asserts in numbered paragraph 20:

> Applicant suggests "the Swales patent fails to teach or suggest ... processing capacity of the application module and the rate of the external requests arriving at an external queue", Paper No. 6, Page 14, lines 3-4. ... Specifically, Swales teaches applying processing capacity as "load factors", col. 11, line 33 "by controlling the reported transmission window as seen by both participants in a connection", col. 14, lines 30-3 1 and rate of requests as "the number of participants can be calculated", col. 13, lines 37-38. The capacity of the network is inherently determined by monitoring relevant elements and the teachings clearly are not limited to the network itself in general.

During an Examiner Interview conducted April 2, 2004, distinguishing features of the presently claimed invention as set forth in the Amendment After Final filed March 23, 2004 were emphasized. An Examiner Interview dated April 2, 2004 indicated that no agreement was reached, and stated:

> The representative argued that fetching based on rate of external requests and processing capacity are not taught [in the Swales patent]. The examiner referred to col. 12, lines 43-44 of Swales as teaching rate of requests by "slowing down traffic" based on "network loading".

The foregoing comments of the Examiner overlook the existence of specific claim language which clearly distinguishes over the Swales patent.

2. The Swales Patent

The Swales patent is directed to providing an interface between a non-real time portion and a real time portion of a network, wherein the interface is used to restrict the flow of messages from the non-real time portion into the real time portion of the network. Referring to the Abstract of the Swales patent, a proxy server is described as being configured to control the rate at which messages are forwarded from the non-real time portion to the real time portion of the network to keep loading on the real time portion stable. However, the proxy server is described throughout the Swales patent as implementing flow control of messages using conventional TCP (as described in the Background portion of Appellants' specification) and proxies with private networks. There is no server in the Swales patent which performs a function of **determining which requests** fetched in an external queue of an application module **will not be processed** based on the **processing capacity** of the application module and the **rate of the external requests arriving at the external queue**.

For example, the proxy server of the Swales patent does not determine requests which will not be processed. Moreover, the proxy server does not make any determinations based on processing capacity of an application module and the rate at which external requests are arriving at any external queue.

In Figure 1 of the Swales patent, Internet 14 connects a client computer 8 with a server 20 of a website 4. The portions of the Swales patent relied upon by the Examiner describe using conventional techniques, such as TCP and proxies, for servicing a client request via a TCP/IP stack. TCP achieves flow control by dropping packets before they are acknowledged by a server. TCP forces **clients** to back-off sending data using, for example, an exponential back-off algorithm. This is precisely the behavior which Appellants' systems minimize, by having a network interaction

module interface with an external queue to proactively determine requests which will not be processed.

Conventional TCP techniques result in dropped connections, and in a client backing off from sending requests when requests made by the client go unacknowledged. These techniques do not provide a server with an ability to determine which requests will not be processed as a function of processing capacity and rate of external requests received.

As described at column 4, lines 3-13 of the Swales patent, server 20 uses TCP in conjunction with IP, through TCP/IP stack 24, to Interact with network interface 16 and application program 22. The Swales patent is directed to monitoring delays due to traffic on the Internet connection, and is not concerned with the manner by which a server processes the requests that it receives.

A web server 30 of a Figure 2 embodiment in the Swales patent is illustrated in Fig. 3 as including TCP/IP stack 54. According to column 5, lines 38-44 of the Swales patent, conventional TCP/IP techniques are described. For example, column 7, lines 11-14 of the Swales patent describes using a TCP/IP stack with the Berkley interface having signal extensions. This is a standard socket interface that allows for packet dropping and TCP/IP back-off (whereby a client begins to back off sending additional requests) for flow control.

Figure 4 shows use of a generic purpose proxy 22 to interface a programmable logic controller (PLC) 80 of a real time portion of a network with a non-real time portion (represented as Internet 14 and intranet 74). See col. 10, lines 24-41. Figure 5 shows a similar system with proxy 116, wherein flow control is maintained using TCP and proxies with private networks, as described at column 12, lines 21-22. It is this flow control which is used to "slow down traffic" as mentioned at column 12, lines 43-44. The proxy does not determine the capacity of a server or the rate at which external requests are arriving at an external queue. Rather, the

flow control is used to restrict traffic flow from the non-real time portion of the network, as described in the last two sentences of the Abstract in the Swales patent.

Thus, the Swales patent does not teach or suggest a mechanism for dealing with a number of requests received at a server which exceed a capacity of the server. Rather, network loading is restricted using known TCP and proxies to provide flow control.

3. Analysis Of Claims 1 and 14

Swales provides no teaching or suggestion of Appellants' claimed **network interaction module** for fetching requests from an **external queue** and for **determining which requests will not be processed** by an application module based on the processing capacity of the application module and the **rate of external requests arriving at an external queue**. Appellant's claimed invention overcomes the shortcoming of a system like Swales, wherein a request will go repeatedly unserviced until the client stops sending them.

The Swales patent uses terms such as "closed connections", "dropped connections" and "aborted connections." This relates to the TCP/IP mechanisms, and does not constitute determining which requests fetched from an external queue will not be processed by an application module based on processing capacity of the application module and the rate of external requests arriving at the external queue. According to the techniques disclosed in the Swales patent, a client and not a server, is responsible for controlling the amount of traffic flow on the network.

Thus, Swales provides no teaching or suggestion to provide Appellants' claimed network interaction module for determining which requests fetched from an external buffer will not be processed by an application module based on the processing capacity of the application module and the rate of external requests arriving at an external queue. As such, independent claim 1 is allowable.

In independent claim 14 recites features similar to those discussed with respect to claim 1. In addition, claim 14 recites, among other features, periodically fetching **all** of external requests stored in an external queue external to the application system into an internal queue of the application system. Claim 14 also recites rejecting requests not to be processed such that the possibility of dropping a request from an external queue is minimized and the response time of the application system to the requests is minimized. Such features are neither taught nor suggested by the Swales patent. As such, claim 14 is also allowable.

4. The Dependent Claims

All of Appellants' dependent claims recite additional advantageous features which further distinguish over the Swales patent. Because these dependent claims incorporate features of independent claims 1 and 14, for at least the reasons set forth above, these claims are allowable.

IX. Conclusion

Reversal of the Examiner's rejection and allowance of claims 1-20 are respectfully requested.

Respectfully submitted,

Burns, Deane, Swecker & Math is, L.L.P.

Date June 28, 2004

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APPENDIX A

The Appealed Claims

1. (Original) A TCP/IP-based application system, comprising:

an application module that performs predetermined functions based on external requests from an external queue, the external queue being external to the application system and storing the external requests before the requests are fetched into the application system;

a network interaction module coupled to the application module and the external queue (1) to fetch the external requests from the external queue into the application system and (2) to determine which, if any, of the fetched requests will not be processed by the application module based on the processing capacity of the application module and the rate of the external requests arriving at the external queue.

2. (Original) The TCP/IP-based application system of claim 1, wherein the network interaction module rejects those requests determined not to be processed by the application module.

3. (Original) The TCP/IP-based application system of claim 2, wherein the network interaction module rejects the requests not to be processed by closing their connections.

4. (Original) The TCP/IP- based application system of claim 2, wherein the network interaction module rejects the requests not to be processed by returning a rejection response with a status code.

5. (Original) The TCP/IP-based application system of claim 4, wherein the rejection response returned by the network interaction module is a HTTP response.

6. (Original) The TCP/IP-based application system of claim 1, wherein the network interaction module also determines which of the fetched requests will be processed first by the application mode.

7. (Previously Amended) The TCP/IP-based application system of claim 1, wherein the network interaction module further comprises:

an internal queue of a predetermined length that receives and stores the external requests fetched from the external queue;

a decision module that (1) causes the external requests to be fetched into the internal queue and (2) determines which of the fetched requests will be processed by the application module and which of the fetched requests will not be processed by the application module based on the processing capacity of the application module and the rate of the external requests arriving at the external queue;

a notification module that requests the requests that are determined not to be processed.

8. (Original) The TCP/IP-based application system of claim 7, wherein the length of the internal queue is at least equal to that of the external queue.

9. (Original) The TCP/IP-based application system of claim 1, wherein the notification module rejects the requests that are determined not to be processed by either closing their connections or sending a rejection response with status code.

10. (Previously Amended) The TCP/IP-based application system of claim 7, wherein the decision module determines which of the fetched requests will not be processed by the application module by:

reducing the number of requests to be processed by the application module if new requests are received in the external queue, wherein the number is previously determined and cannot be less than one;

increasing the number of requests to be processed by the application module if no new requests are received in the external queue, wherein the number cannot exceed the length of the external queue;

storing remaining unprocessed requests in the internal queue;

fetching all new request from the external queue into the internal queue and causing all of the newly fetched request that cannot be stored in the internal queue not to be processed.

11. (Original) The TCP/IP-based application system of claim 10, wherein the number of requests to be processed is either increased or reduced by a factor of two.

12. (Previously Amended) The TCP/IP-based application system of claim 1, wherein the network interaction module determines which of the fetched requests will not be processed by the application module by:

reducing the number of requests to be processed by the application module if new requests are received in the external queue, wherein the number is previously determined and cannot be less than one;

increasing the number of requests to be processed by the application module if no new requests are received in the external queue, wherein the number cannot exceed the length of the external queue;

storing remaining requests in an internal queue;

fetching all new requests from the external queue into the internal queue and causing all of the newly fetched requests that cannot be stored in the internal queue not to be processed.

13. (Original) The TCP/IP-based application system of claim 1, wherein the number of requests to be processed is either increased or reduced by a factor of two.

14. (Original) In a TCP/IP-based application system, a method of minimizing response time of the application system to external requests, comprising the steps of:

periodically fetching all of external requests stored in an external queue external to the application system into an internal queue of the application system;

determining which, if any, of the fetched requests not to be processed by the application system based on the processing capacity of the application module and the rate of the external requests arriving at the external queue;

rejecting the requests not to be processed such that the possibility of dropping a request from the external queue is minimized and the response time of the application system to the requests is minimized.

15. (Original) The method of claim 14, wherein the step of rejecting the requests not to be processed is performed by closing their connections.

16. (Original) The method of claim 14, wherein the step of rejecting the requests not to be processed is performed by returning a rejection response with a status code.

17. (Original) The method of claim 16, wherein the rejection response is a HTTP response.

18. (Previously Amended) The method of claim 14, further comprising: the step of determining which of the fetched requests will be processed first.

19. (Previously Amended) The method of claim 14, wherein the step of determining which of the fetched requests are not to be processed further comprises the steps of:

reducing the number of requests to be processed if new requests are received in the external queue, wherein the number is previously determined;

increasing the number of requests to be processed if no new requests are received in the external queue;

storing remaining requests in an internal queue of the application system;

fetching all new requests from the external queue into the internal queue and causing all of the newly fetched requests than cannot be stored in the internal queue not to be processed.

20. (Original) The method of claim 19, wherein the number of requests to be processed is either increased or reduced by a factor of two.